

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. - 40. (CANCELED).

41. (NEW) A motor generator system having an internal combustion engine for a driving source of a car and a battery device 10 as power supply and mounted on a hybrid car, said system comprising:

a motor generator mechanically connected with a crank shaft of the internal combustion engine;

an inverter for controlling said motor generator;

a control circuit for controlling said inverter; and

a voltage control circuit provided between said battery device and said inverter;

wherein said motor generator generates a driving force by receiving a power supplied from said battery device through said inverter;

said motor generator generates power by receiving a motive power from the internal combustion engine, and said motor generator supplies said generated power to said battery device through said inverter;

said inverter controls a drive of said motor generator and a power generation of said motor generator by receiving a command from said control circuit; and

wherein when said motor generator generates said generated power by receiving the motive power from the internal combustion engine, and when said motor generator supplies said generated power to said battery device through said inverter, said voltage control circuit steps down a power generation voltage of said motor generator to form said generated power voltage of said motor generator to reach a charging voltage of said battery device.

42. (NEW) A motor generator system according to claim 41, wherein

said motor generator is a synchronous type electric rotating machine having its rotor equipped with a field magnetic pole constituted by a permanent magnet or its rotor equipped with a field magnetic pole constituted by a jaw type magnetic pole; and

a weak field rate of said motor generator, which is expressed by a ratio between a rotational speed in the maximum torque of said motor generator and the maximum rotational speed of said motor generator, is set that when a rotational speed in the maximum torque of said motor generator is 1, and the maximum rotational speed of said motor generator is less than 4.

43. (NEW) A motor generator system according to claim 41, wherein

said motor generator is an induction type electric rotating machine having its rotor equipped plural secondary conductors arranged to an iron core; and

a weak field rate of said motor generator, which is expressed by a ratio between a rotational speed in the maximum torque of said motor generator and the maximum rotational speed of said motor generator, is set that when a rotational speed in the maximum torque of said motor generator is 1, the maximum rotational speed of said motor generator is more than 3.

44. (NEW) A motor generator system according to claim 41, wherein

when said battery device includes a main battery of 42-volt charging voltage and an auxiliary battery of 14-volt charging voltage, said motor generator generates a driving force by receiving a power supplied from said main battery through said inverter, said motor generator generates said generated power by receiving the motive force from the internal combustion engine, and

said motor generator supplies said generated power to said main battery through said inverter; and

when said motor generator generates said generated power by receiving the motive force from the internal combustion engine and said motor generator supplies said generated power to said main battery, and when said generated power voltage of said motor generator is larger than a charging voltage of said main battery, and when said generated power voltage of said motor generator is larger than a charging voltage of said main battery, said voltage control circuit, which is supplied to said main battery through said inverter, steps down said generated power voltage of said motor generator to form said generated power voltage of said motor generator to reach a charging voltage of said main battery.

45. (NEW) A motor generator system according to claim 41, wherein

when said motor generator generates said generated power by receiving the motive force from the internal combustion engine and said motor generator supplies said generated power to said battery device through said inverter, and a weak field control for controlling a step-down control according to said voltage control circuit and a current phase of a stator winding of said motor generator is carried out by said inverter to provide a weak field component, thereby said generated voltage of said motor generator agrees with said charging voltage of said battery device.

46 (NEW) A motor generator system according to claim 41, wherein

when said motor generator generates said generated power by receiving the motive force from the internal combustion engine and said motor generator supplies said generated power to said battery device through said inverter, substantially at an idling rotational speed of the internal combustion

engine, a strong field control for controlling a current phase of a stator winding of said motor generator is carried out by said inverter to provide a strong field control,

with an increase of a rotational speed of the internal combustion engine, a strong field control for controlling said current phase of said stator winding of said motor generator is carried out by said inverter to provide a strong field component and a power generation voltage of said motor generator is kept to maintain the charging voltage of said battery device;

when the rotational speed of the internal combustion engine increase further, a weak field control for controlling said current phase of said stator winding of said motor generator is carried out by said inverter to provide a weak component; and

under a state in which said weak component is maintained, a step-down voltage control according to said voltage control circuit is carried out, whereby said generated voltage of said motor generator is substantially the same as said charging voltage of said battery device.

47. (NEW) A motor generator system according to claim 41, wherein

said voltage control circuit is constituted by a step-down chopper.

48. (NEW) A motor generator system having an internal combustion engine for a driving source of a car and a battery device as a power supply and mounted on a hybrid car, said system comprising:

a motor generator mechanically connected with a crank shaft of the internal combustion engine;

an inverter for controlling said motor generator;

a control circuit for controlling said inverter; and

a voltage control circuit provided between said battery device and said inverter;

wherein said motor generator generates a driving force by receiving a power supplied from said battery device through said inverter;

said motor generator generates power by receiving a motive power from the internal combustion engine, and said motor generator supplies said generated power to said battery device through said inverter;

said inverter controls a drive of said motor generator and power generation of said motor generator by receiving a command from said control circuit; and

when a driving force is generated by receiving a supply of said power from said battery device and the internal combustion engine begins to start by said driving force, said voltage control circuit steps up a voltage of a battery power outputted from said battery device.

49. (NEW) A motor generator system according to claim 48, wherein

said motor generator is a synchronous type electric rotating machine having its rotor equipped with a field magnetic pole constituted by a permanent magnet or its rotor equipped with a field magnetic pole constituted by a jaw type magnetic pole; and

a weak field rate of said motor generator, which is expressed by a ratio between a rotational speed in the maximum torque of said motor generator and the maximum rotational speed of said motor generator, is set that when a rotational speed in the maximum torque of said motor generator is 1, the maximum rotational speed of said motor generator is less than 4.

50. (NEW) A motor generator system according to claim 48, wherein

said motor generator is an induction type electric rotating machine having its rotor equipped plural secondary conductors arranged to an iron core; and

a weak field rate of said motor generator, which is expressed by a ratio between a rotational speed in the maximum torque of said motor generator and the maximum rotational speed of said motor generator, is set that when a rotational speed in the maximum torque of said motor generator is 1, the maximum rotational speed of said motor generator is more than 3.

51. (NEW) A motor generator system according to claim 48, wherein

when said battery device includes a main battery of 42-volt charging voltage and an auxiliary battery of 14-volt charging voltage, said motor generator generates a driving force by receiving a power supplied from said main battery through said inverter, said motor generator generates said generated power by receiving the motive force from the internal combustion engine, and said motor generator supplies said generated power to said main battery through said inverter; and

when said motor generator generates a driving force by receiving a supply of a power from said battery device through said inverter and the internal combustion engine begins to start by said driving force, said voltage control circuit steps up a voltage of a battery power outputted from said main batter.

52. (NEW) A motor generator system according to claim 48, wherein

when said motor generator generates a driving force by receiving a supply of a power from said battery device through said inverter and the internal combustion engine begins to start by said driving force, a strong field control for controlling a current phase of a stator winding of said motor generator is carried out by said inverter to provide a strong field current component.

53. (NEW) A motor generator system according to claim 48, wherein

when said motor generator generates a driving force by receiving a supply of a power from said battery device through said inverter, and when the internal combustion engine begins to start by said driving force, until a rotational speed of the internal combustion engine for necessary the maximum torque of said motor generator is reached, a step-up voltage control according to said voltage control circuit and a strong field control for controlling a current phase of a stator winding of said motor generator carries out by said inverter to get a strong field current component;

until a rotational speed area larger than a rotational speed during a start time of the internal combustion engine is reached, when a torque assist is carried out according to said motor generator, a weak field control for controlling said current phase of said stator winding of said motor generator by said inverter and a step-up voltage control according to said voltage control circuit are carried out to provide a weak field current component.

54. (NEW) A motor generator system according to claim 48, wherein

a conversion voltage ratio of a battery voltage of said voltage control circuit is set at 1.5 times or more, and a current capacity of a switching element of said inverter circuit is smaller than a current capacity of a switching element of said voltage control circuit.

55. (NEW) A motor generator system according to claim 48, wherein

said voltage control circuit is constituted by step-up chopper.

56. (NEW) A motor generator system having an internal combustion engine for a driving source of a car and a battery device as a power supply and mounted on a hybrid car, said system comprising:

a motor generator mechanically connected with a crank shaft of the internal combustion engine;

an inverter for controlling said motor generator;

a control circuit for controlling said inverter; and

a voltage control circuit provided between said battery device and said inverter;

wherein said motor generator generates a driving force by receiving a power supplied from said battery device through said inverter;

said motor generator generates a power by receiving a motive power from the internal combustion engine, and said motor generator supplies said generated power to said battery device through said inverter;

said inverter controls a drive of said motor generator and a power generation of said motor generator by receiving a command from said control circuit;

wherein when said motor generator generates a driving force by receiving a supply of a power from said battery device through said inverter and the internal combustion engine begins to start by said driving force, said voltage control circuit steps up a voltage of a battery power outputted from said battery device; and

wherein when said motor generator generates said generated power by receiving the motive force from the internal combustion engine and said motor generator supplies said generated power to said battery device, said voltage control circuit supplied to said battery device through said inverter steps down said generated power voltage of said motor generator to form said generated power voltage of said motor generator to reach a charging voltage of said battery device.

57. (NEW) A motor generator system according to claim 56, wherein

said voltage control circuit comprises a step-down chopper and a step-up chopper.

58. (NEW) A motor generator system according to claim 56, wherein

said motor generator is a synchronous type electric rotating machine having its rotor equipped with a field magnetic pole constituted by a permanent magnet or its rotor equipped with a field magnetic pole constituted by a jaw type magnetic pole; and

a weak field rate of said motor generator, which is expressed by a ratio between a rotational speed in the maximum torque of said motor generator and the maximum rotational speed of said motor generator is set that when a rotational speed in the maximum torque of said motor generator is 1, the maximum rotational speed of said motor generator is less than 4.

59. (NEW) A motor generator system according to claim 56, wherein

said motor generator is an induction type electric rotating machine having its rotor equipped plural secondary conductors arranged to an iron core; and

a weak field rate of said motor generator, which is expressed by a ratio between a rotational speed in the maximum torque of said motor generator and the maximum rotational speed of said motor generator is set that when a rotational speed in the maximum torque of said motor generator is 1, the maximum rotational speed of said motor generator is more than 3.

60. (NEW) A motor generator system according to claim 56, wherein

when said battery device includes a main battery of 42-volt charging voltage and an auxiliary battery of 14-volt charging voltage, said motor

generator generates a driving force by receiving a power supplied from said main battery through said inverter, said motor generator generates said generated power by receiving the motive force from the internal combustion engine, and said motor generator supplies said generated power to said main battery through said inverter;

when said motor generator generates said generated power by receiving the motive force from the internal combustion engine and said motor generator supplies said generated power to said main battery, and when said generated power voltage of said motor generator is larger than a charging voltage of said main battery, said voltage control circuit supplied to said main battery through said inverter steps down said generated power voltage of said motor generator to form said generated power voltage of said motor generator to reach a charging voltage of said main battery; and

when said motor generator generates a driving force by receiving a supply of a power from said main battery through said inverter and the internal combustion engine begins to start by said driving force, said voltage control circuit steps up a voltage of a battery power outputted from said main battery.

61. (NEW) A motor generator system according to claim 56, wherein

when said motor generator generates said generated power by receiving the motive force from the internal combustion engine and said motor generator supplies said generated power to said battery device through said inverter, and a weak field control for controlling a step-down control according to said voltage control circuit and a current phase of a stator winding of said motor generator is carried out by said inverter to get a weak field component, thereby said generated voltage of said motor generator agrees with said charging voltage of said battery device; and

when said motor generator generates a driving force by receiving a supply of a power from said battery device through said inverter and when the

internal combustion engine begins to start by said driving force, a strong field control for controlling a current phase of a stator winding of said motor generator is carried out by said inverter to get a strong field current component.